Investigation of the interaction of chlorides of the alkali and alkaline earth elements in fusion.- I. Ternary system of sodium, rubidium, and calcium chlorides. V. E. Plyushchev, P. V. Kovalev, and I. V. Shakhno (Inst. Fine Chem. Technol., Moscow). Zhur. Obshchei Khim. 25, 855-60(1955).—Tables and curves of m.ps. of 225 ternary mixts. of the 3 anhyd. salts in which each varies from 0 to 100 mole % are given, with a triangular diagram of the area of liquidus. In the latter, four regions of crystn. are found; three represent the pure salts and the fourth, represents RbCl.CaCl$_2$. No 3-component compds. were observed. Two eutectics are found: RbCl 2.5%, NaCl 45%, and CaCl$_2$ 52.5%, m. 500°, and CaCl$_2$ 11.2%, NaCl 32.8%, and RbCl 56.0%, m. 505°. Because of the hygroscopicity of CaCl$_2$, it was fused first and then the other compds. were added.
— Malcolm M. Anderson

PLYUSHCHEV,V.Ye.; SHAKHNO,I.V.; POZHITKOVA,S.A.

Investigation of the interaction of fused alkali metal and alkaline
earth chlorides. Part 2. The ternary sytem: sodium chloride - cesium
chloride - calcium chloride. Zhur.ob.khim.25 no.6:1072-1075 Je'55.
(MLRA 8:12)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii
   (Alkaline earth chlorides) (Alkali metal chlorides)
            (Systems (Chemistry))

SHAKHNO, I. V., Cand of Chem Sci. and PLYUSHCHEV, V. Ye., Cand of Chem Sci.

"Rubidium and Cesium, Their Applications and the Methods of Producing Them," by V. Ye. Plyushchev, Candidate of Chemical Sciences, and I. V. Shakhno, Candidate Chemical Sciences, Khimicheskaya Nauka i Promyshlennost', Vol 1, No 5, Sep/Oct 56, pp 534-539

Methods for the production of compounds of rubidium and cesium and of these metals themselves are reviewed. The applications of these metals and of their compounds are outlined with particular attention to uses in photocells. Cs_2Te, Rb_2Te, and Cs_3Sb photocathodes are mentioned, as is also the use of rubidium and cesium metazirconates Me_2ZrO_3 and orthostannates Me_4SnO_4 as luminescent substances in gas-filled electrical tubes. The medical applications of cesium eosinate are discussed on the basis of a French paper. An American patent is mentioned which proposes that the piezoelectric properties of RbH_2PO_4 be utilized and that furthermore mixed crystals containing cesium, which are obtained from phosphate solutions, be used as piezoelectrics.

A suggestion that the NaOH and KOH of storage batteries be replaced fully or partially with CsOH or RbOH so that these batteries will operate more efficiently at low temperatures of the order of minus 50° C is discussed on the basis of another American patent.

In conclusion, the statement is made that there are plentiful supplies of raw materials containing rubidium and cesium and that the production of these metals in the USSR should be expanded greatly in the near future, notwithstanding the difficulty of processing some of the raw materials. Furthermore, the suggestion is made that carnallite, which is used to an ever-increasing extent for the production of magnesium and potassium, be also processed for rubidium.

A bibliography consisting of 33 references, 3 of them USSR, is appended to the article.

Sum 1239

FLYUSHCHEV, V.Ye.; SKLKHNO, I.V. (Moskva).

Development and present state of the technology of rubidium cesium, and their compounds. Usp. khim. 26 no.8:944-964 Ag '57.(MLRA 10:8)
(Rubidium)   (Cesium)

SHAKHNO, I.V.

AUTHOR   URAZOV, G.G., Member of the Academy PLYUSHCHEV. V.Ye.,   20-3-33/57
            SHAKHNO, I.V.

TITLE   On Monotropic Transformation of Spodumene.
            (K voprosu o monotropnom prevrashchenii spodumena -Russian)

PERIODICAL Doklady Akademii Nauk SSSR,Vol 113,Nr 2,pp 361-363(U.S.S.R.)
            Received 6/1957   Reviewed 7/1957

ABSTRACT   Among the numerous lithium minerals spodumene was above all, in-
            vestigated; its thermal properties were the most interesting:
            fusibility and transformations at high temperatures. The fusion
            point values obtained 50 years ago ($1080-1090°$) are too low and
            not up to date. About one decade later the area $920-980°$ was re-
            garded as zone of fusion (Endell and Rieke). In reality the spe-
            cific gravity and the reflective index remain unchanged up to $920°$.
            At about $950°$ spodumene passes into a different highly symmetri-
            cal modification. The volume abruptly increases by 24%. The speci-
            fic gravity increases from $d=3.147$ ($20°$) to $d=2.367$ ($1380°$). Re-
            flective index is $n'=1.66$ from 20 to $920°$, then (at $980°$) it sud-
            denly changes and increases to 1.519 and remains constant at hi-
            gher temperatures. The authors call this zone- the zone of thermal
            transformation- the spodumene. The new modification is irreversib-
            le and polymorpheus. The spodumene-modification found in nature
            was called α-spodumene, the new one β-spodumene. This suggestion
            is considered correct by the authors, as there are no chemical,
Card 1/3   but only physical and optical differences in comparison with the

            natural spodumene. All spodumene-minerals occurring in nature are
            to be regarded as a metastable form in relation to the β-form.
            The practical consequence of these investigations was the burning
            of spodumene containing rock in order to enrich it with lithium.
            The time needed by burning for the purpose of producing β spodu-
            mene does not only depend on the place of discovery but also on
            the ore-deposit, as in nature pure spodumene does not occur, but
            only the most different phases of efflorescence. In consequence
            of hypergene modifications the kaolinization of the spodumene inc-
            reases, furthermore albitization takes place. A thermal analysis
            can determine kaolinization. From the curves of temperature effects
            (schedule 2) it is obvious that, together with an accelerated hea-
            ting, the temperature of initial transformation rises and the in-
            terval of transformation is extended. The influence of the velo-
            city of warming up has to be taken into consideration in connec-
            tion with the solution of a number of problems by thermial analy-
            sis, which, unfortunately, is not always done. The mechanical ad-
            dition of pure quartz and calcium sulfate (schedule 3 compared
            with schedule 2) has a lowering effect on the $\alpha-\beta$-transformation
            temperature of the spodumene. With increasing quantities of admix-
            ture the influence is intensified. Potassium sulfate has a wea-
            ker effect. The admixtures contained in the spodumene itself (up
Card 2/3   to 10 according to Gabriel and possibly even more) have a remark-

Concerning Several Regularities in the Change of   SOV/156-58-2-18/48
Solubility of the Alkali Metal Chlorides in Alcohols

appropriate experiments at 0 - 70°. Solvents used were CH_3OH,

C_2H_5OH, n.C_3H_7OH, n.C_4H_9OH, iso-C_4H_9OH(primary) and iso-

$C_5H_{11}OH$ (primary). In the system with LiCl 5 - 6 days were

allowed for the system to reach equilibrium, 6 - 7 days were
allowed for the others. The solid phase, which was in equilibrium
with the saturated solution was the original starting chloride.
Distinct phases formed by the dissolution of LiCl in CH_3OH

and in C_2H_5OH at 0^C. They represented LiCl $\cdot$ 3CH_3OH and

LiCl.4C_2H_5OH (Ref 6). Table 1 shows the extreme solubility
(in weight per cent) plus the range of temperature during
the investigation. From this data the following peculiarities
are emphasized: 1) The solubility of each chloride increases
gradually with temperature. Only with the formation of the
solvated form does the curve show a divergence, corresponding
to the second branching. 2) This solubility increases with
increasing molecular weight of both the normal and iso-alcohols.
3) LiCl is striking for its relatively high solubility in all
alcohols. With the increasing atomic number the solubility of

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Concerning Several Regularities in the Change of   SOV/156-58-2-18/48
Solubility of the Alkali Metal Chlorides in Alcohols

the chloride changes rapidly, so that in the transition from
LiCl to KCl it increases by 100 to 10 000 times, while it
increases twelve-fold in the transitions from RbCl to CsCl.
There are 1 table and 6 references, 2 of which are Soviet.

ASSOCIATION: Kafedra tekhnologii redkikh i rasseyannykh elementov Moskovskogo
instituta tonkoy khimicheskoy tekhnologii im.M.V.Lomonosova
(Chair of Technology of the Rare and Dispersed Elements of the
Moscow Institute for Precision Chemical Technology imeni M.V.
Lomonosov)

SUBMITTED: October 31, 1957

Card 3/3

SHAKHNO, I. V.

SOV/78-3-9-21/38

AUTHORS: Plyushchev, V. Ye., Simanov, Yu. P., Shakhno, I. V.

TITLE: The High Temperature Synthesis of the Rubidium Aluminum Silicate (Vysokotemperaturnyy sintez alyumosilikata rubidiya)

PERIODICAL: Zhurnal neorganicheskoy khimii, 1958, Vol 3, Nr 9, pp 2133-2137 (USSR)

ABSTRACT: In the present paper the results of the investigations of the high temperature synthesis of the rubidium aluminum silicate of the composition $Rb_2O \cdot Al_2O_3 \cdot 4SiO_2$ were communicated. The reaction of the interaction between β-spodumene and Rb_2SO_4 was carried out at temperatures of 850, 950, and 1000°C in the case of different ratios of the components. The reaction is carried out according to the following scheme:
$$2Li[AlSi_2O_6] + Rb_2SO_4 \rightarrow 2Rb[AlSi_2O_6] + Li_2SO_4.$$
The interaction between β-spodumene and Rb_2SO_4 lasts two hours.
The samples obtained were radiographically analyzed. The thermo-graphic analysis showed that a polymorphous transformation of the low temperature modification into the high temperature

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modification takes place at 1055-1060°C. In the case of a second heating of $Rb[AlSi_2O_6]$ no transformation could be found.
The results show that the aluminum silicate of rubidium is similar to leucite $K[AlSi_2O_6]$ with tetragonal lattice
$a = 13.36$ kX and $c = 13.72$ kX. There are 1 figure, 1 table, and 11 references, 7 of which are Soviet.

ASSOCIATION: Moskovskiy gosudarstvennyy universitet im. M. V. Lomonosova (Moscow State University imeni M. V. Lomonosov) Moskovskiy institut tonkoy khimicheskoy tekhnologii im. M. V. Lomonosova (Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov)

SUBMITTED: July 8, 1957

Card 2/2

AUTHORS: Plyushchev, V. Ye., Shakhno, I. V.   SOV/156-58-4-45/49

TITLE: Investigation of the Interaction Process of Pollucite
              With Mixtures of Oxides and Chlorides of Calcium (Izucheniye
              protsessa vzaimodeystviya pullutsita so smes'yu okisi i
              khlorida kal'tsiya)

PERIODICAL: Nauchnyye doklady vysshey shkoly. Khimiya i khimicheskaya
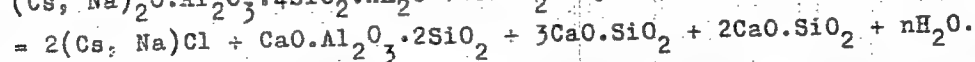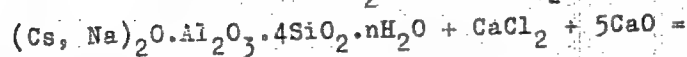   tekhnologiya, 1958, Nr 4, pp 785-788 (USSR)
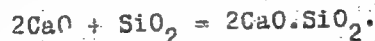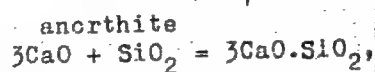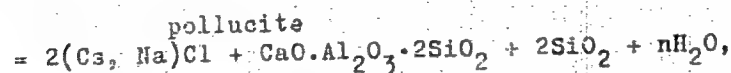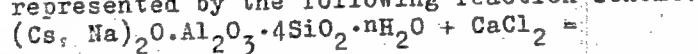
ABSTRACT: The results of the investigation of the technological
              process for the production of CsCl from pollucite was
              described. All experiments were carried out with absolutely
              pure pollucite. Slight impurities such as Cu, Sn, Mn, Fe,
              Pb, Li, K, Rb, and Ge were determined by spectrum analysis.
              On the treatment of pollucite with a mixture of CaO and
              $CaCl_2$ the alkali metals were transformed into chlorides. The
              phase that is insoluble in water, i. e. the solid phase,
              consists of the following compounds according to
              radiographic and thermal analyses: 1) anorthite,
              2) tricalcium silicate, and 3) dicalcium silicate in the

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Investigation of the Interaction Process of   SOV/156-58-4-45/49
Pollucite With Mixtures of Oxides and Chlorides of Calcium

form of γ, β and α'. The presence of 3 modifications of $2CaO.SiO_2$ was confirmed by thermal analysis. The interaction mechanism of pollucite with a mixture of CaO and $CaCl_2$ is represented by the following reaction scheme:

$$\underbrace{(Cs, Na)_2O.Al_2O_3.4SiO_2.nH_2O}_{\text{pollucite}} + CaCl_2 =$$

$$= 2(Cs, Na)Cl + \underbrace{CaO.Al_2O_3.2SiO_2}_{\text{anorthite}} + 2SiO_2 + nH_2O,$$

$$3CaO + SiO_2 = 3CaO.SiO_2,$$

$$2CaO + SiO_2 = 2CaO.SiO_2.$$

$$(Cs, Na)_2O.Al_2O_3.4SiO_2.nH_2O + CaCl_2 + 5CaO =$$

$$= 2(Cs, Na)Cl + CaO.Al_2O_3.2SiO_2 + 3CaO.SiO_2 + 2CaO.SiO_2 + nH_2O.$$

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Investigation of the Interaction Process of   SOV/156-58-4-45/49
Pollucite With Mixtures of Oxides and Chlorides of Calcium

There are 1 figure, 1 table, and 10 references, 7 of which
are Soviet.

ASSOCIATION: Kafedra tekhnologii redkikh i rasseyannykh elementov
Moskovskogo instituta tonkoy khimicheskoy tekhnologii
im. M. V. Lomonosova (Chair of Technology of Rare and
Trace Elements at the Moscow Institute of Fine Chemical
Technology imeni M. V. Lomonosov)

SUBMITTED: February 13, 1958

Card 3/3

AUTHORS: Plyushchev, V. Ye.,   Shakhno, I. V.

TITLE: Investigation of the Interaction of Minerals Containing Rare Al-
kali Elements, With Salts and Oxides in the Sintering and Fusion Pro-
cesses (Issledovaniye vzaimodeystviya mineralov, soder-
zhashchikh redkiye shchelochnyye elementy, s solyami i okis-
lami v protsessakh spekaniya i splavleniya). I. On the Produc-
tion of Cesium Chloride by the Interactions of Pollucite With
Calcium Oxide and -Chloride (I. O poluchenii khlorida tseziya
pri vzaimodeystvii pollutsita s okis'yu i khloridom kal'tsiya)

PERIODICAL: Izvestiya vysshikh uchebnykh zavedeniy. Khimiya i khimicheskaya
tekhnologiya, 1958, Nr 6, pp 54-60 (USSR)

ABSTRACT: In several hundreds of papers on the processing of the raw
material with a content of rare elements mostly purely tech-
nological problems are discussed. The investigations of
theoretical problems have been lagging far behind the former
type of investigations. The paper under consideration serves
the purpose of partly filling this gap. It is the first of
three papers dedicated to the processing of pollucite

Card 1/4 $(Cs.Na)\left[AlSi_2O_6\right]nH_2O$. The well-known processing methods for

Investigation of the Interaction of Minerals Containing Rare Alkali Elements,
With Salts and Oxides in the Sintering and Fusion Processes. I. On the
Production of Cesium Chloride by the Interaction of Pollucite With Calcium
Oxide and -Chloride

pollucite can be divided into 3 groups: 1) acid methods, 2) direct
cesium production methods from ores, and 3) the methods mention-
ed in the title. A survey of scientific publications on said
method is given (Refs 1-13). The methods of the 3rd group,
sintering and fusion, are at present not very numerous (Ref. 13).
This method mentioned in the subtitle has a number of advantages
over other methods, as the compound desired by the technologist
can be isolated almost directly. However, with a low cesium
content (compared with other alkali metals), the reprecipita-
tion of $3CsCl.2SbCl_3$ or a preliminary fractioned crystalliza-
tion are necessary for a separation from sodium. The authors
employed said method of pollucite decomposition for the produc-
tion of pure CsCl. Subsequently, the results of the chemo-
technological investigation of the CsCl production process
by interaction with a CaO- and $CaCl_2$ mixture are described.
The experimental part contains discussions of: S t u d y o f
t h e   r o l e s   p l a y e d   b y   i n d i v i d u a l
r e a g e n t s   i n   t h e   d e c o m p o s i t i o n

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Investigation of the Interaction of Minerals Containing Rare Alkali Elements,
With Salts and Oxides in the Sintering and Fusion Processes. I. On the
Production of Cesium Chloride by the Interactions of Pollucite With Calcium
Oxide and -Chloride

p r o c e s s   o f   p o l l u c i t e (Table 1 with CaO,
Table 2 with NaCl, KCl, $CaCl_2$ and $BaCl_2$). From this it is
obvious that the last-mentioned 4 chlorides cannot be used
as independent reagents for pollucite decomposition. $CaCl_2$
yielded the best results. However, the cesium yield from the
concentrate falls noticeably at $900°$. The role played by
CaO must, however, not be underestimated. After all, $CaCl_2$
by itself is not able to fully complete the reaction. The
shift of the reaction is secured only by CaO , as it favors
the formation of Al and Si into insoluble compounds. Table 3
presents data thereon, as well as on the interactions with
other mixtures. The interaction of pollucite with CaO and
$CaCl_2$ yields the total cesium quantity in a water-soluble

Card 3/4   state in the form of CsCl. There are 3 tables and 18 refer-

SOV/153-58-6-1o/22

Investigation of the Interaction of Minerals Containing Rare Alkali Elements, With Salts and Oxides in the Sintering and Fusion Processes. I. On the Production of Cesium Chloride by the Interaction of Pollucite With Calcium Oxide and -Chloride

ences, 4 of which are Soviet.

ASSOCIATION: Kafedra tekhnologii redkikh i rasseyannykh elementov; Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni M. V. Lomonosova
(Chair of Technology of Rare and Scattered Elements; Moscow Institute of Fine Chemical Technology imeni M. V. Lomonosov)

SUBMITTED: January 9, 1958

Card 4/4

5(1,2)   SOV/153-2-4-22/32
AUTHORS: Plyushchev, V. Ye., Shakhno, I. V.

TITLE: Investigation of the Interaction of Minerals Containing Alkali
                Elements With Salts and Oxides in Sintering and Melting Pro-
                cesses. II. Thermographical Investigation of the Interaction
                Process of Pollucite With Calcium Oxide and Calcium Chloride

ABSTRACT: The procedure (at high temperatures) mentioned in the subtitle
                is one of the most popular among various methods of processing
                pollucite to cesium compounds. Its superiority was confirmed
                by the authors. They showed the role played by individual re-
                action participants in the decomposition of the mineral
                mentioned by technological investigation, and examined the
                optimum conditions of interaction (Ref 1). The role played by
                each of the constituents of the charge could be defined, and
                the nature of the water-soluble components of the sintering
                products explained by means of the results shown here. Pure
                pollucite was used which was controlled by means of cathode
Card 1/4   rays according to G. F. Komovskiy and O. N. Lozhnikova (Ref 2).

Investigation of the Interaction of Minerals Containing SCV/153-2-4-22/32
Alkali Elements With Salts and Oxides in Sintering and Melting Processes.
II. Thermographical Investigation of the Interaction Process of Pollucite
With Calcium Oxide and Calcium Chloride

The table (p 583) shows the results of the investigation
mentioned in the subtitle. Hence it appears that pure roasted
pollucite does not undergo any transformations between 20 and
950°. The ideas (still insufficient at present) on the charac-
ter of the interaction between CaO and $CaCl_2$ do not influence
the results and conclusions. The heating curves of mixtures
containing pollucite do not differ from curves of substances
or mixtures not containing pollucite. Thus, they give no in-
dication as to the reaction process. The more difficult task
of deciphering the thermograms of the sintering products can
be solved by comparing the thermal variations of the initial
components and the thermal variations caused by the interaction
of the charge components with those depending on the properties
of the water-soluble salt system formed. The latter variations
are caused by the interaction of excess $CaCl_2$ with cesium- and
sodium chloride. These salts are formed because of the re-
action of $CaCl_2$ with pollucite (Ref 10). On account of the data
Card 2/4   on this interaction, an approximate computation can be made

Investigation of the Interaction of Minerals Containing SOV/153-2-4-22/32
Alkali Elements With Salts and Oxides in Sintering and Melting Processes.
II. Thermographical Investigation of the Interaction Process of Pollucite
With Calcium Oxide and Calcium Chloride

of the CsCl- and NaCl-quantity formed by this reaction, and the
excess $CaCl_2$ which together form the soluble salt system. The
thermal transformations in this system can easily be found by
means of heating curves with the use of the melting-point dia-
gram of the system $NaCl-CsCl-CaCl_2$. Upon comparison of this
melting-point diagram with data on the fusibility of the salt
mass of the sintering products, it may also be concluded that
the sintering of pollucite with CaO and $CaCl_2$ proceeds under
optimum conditions only if little melt is formed. This increases
the exchange degree of the reaction. The thermogram of pollucite
with CaO is simplest among all thermograms of sintering products.
No reaction occurs between pollucite and $CaO-CaCl_2$ under optimum
conditions for the interaction of pollucite with the CaO-mixture.
Figure 1 shows the heating curve of the sintering product of
pollucite with $CaCl_2$, figure 2 that with CaO and $CaCl_2$. They are
thoroughly analyzed, and compared with each other. The results
of the thermographical investigation will be published in an
Card 3/4   additional paper. There are 2 figures, 1 table, and 11 references,

Investigation of the Interaction of Minerals Containing SOV/153-2-4-22/32
Alkali Elements With Salts and Oxides in Sintering and Melting Processes.
II. Thermographical Investigation of the Interaction Process of Pollucite
With Calcium Oxide and Calcium Chloride
                9 of which are Soviet.
ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni M. V.
             Lomonosova; Kafedra tekhnologii redkikh i rasseyannykh elementov
             (Moscow Institute of Fine Chemical Technology imeni M. V. Lomo-
             nosov; Chair of Technology of Rare and Dispersed Elements)

SUBMITTED: April 21, 1958

Card 4/4

PLYUSHCHEV, V.Ye.; SHAKHNO, I.V.

Reactions of minerals containing rare alkali elements with salts
and oxides in the processes of sintering and fusion. Part 3:
745-750 '59.   (MIRA 13:8)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni
M.V. Lomonosova, kafedra tekhnologii redkikh i rasseyanykh elementov.
                (Pollucite) (Calcium oxide) (Calcium chloride)

5(1, 2)
AUTHORS: Plyushchev, V.Ye., Simanov, Yu. P.,   SOV/20-125-2-26/64
              Shakhno, I. V.

TITLE: On the β-Modification of Spodumene (O beta-modifikatsii
              spodumena)

PERIODICAL: Doklady Akademii nauk SSSR, 1959, Vol 125, Nr 2, pp 334-336
              (USSR)

ABSTRACT: Spodumene constitutes the most important industrial lithium
              source, and is characterized by the formula $Li_2O \cdot Al_2O_3 \cdot 4SiO_2$.
              However, the percentage of the components in spodumene varies
              as it never occurs pure (Refs 1, 2). Many elements are present
              in spodumene as isomorphic substituents, and cannot be removed
              mechanically (Refs 2, 3). Most of them replace lithium in the
              crystal lattice. From the processes in nature it becomes
              obvious that this lithium replacement can attain significant
              dimensions (Ref 4). This is the main characteristic of spodumene
              erosion by which the mineral is deprived of its value. Sodium
              plays the most conspicuous role in this process. Although
              spodumene for a long time used to figure with the alumo-
              silicates, there is no doubt today that it constitutes a double

Card 1/3

On the β-Modification of Spodumene   SOV/20-125-2-26/64

silicate of lithium and aluminium (Ref 5). Natural spodumene
(mostly called α-spodumene) is characterized above all by
the monotropic transition, between 950 and 1100°, into a
high-temperature modification (β-modification or β-spodumene,
Ref 7). This irreversible transition is of great practical
importance, as in the roasting of spodumene-containing rocks
it can be employed for their enrichment in lithium. Unlike
α-spodumene the β-modification is brittle and comminutes
easily. Thus a concentrate can be obtained by means of sifting.
Contrary to the case of the α-modification there are no
conclusive data on the structure of β-spodumene. It may be
assumed that the symmetry of the latter is higher. The authors
made an x-ray study of the latter. The results (Table 1) can
be considered satisfactory only for 54 lines of the x-ray
photograph. The paper under consideration was started under
the direction of the late Academician G. G. Urazov (for
many years Head of the Kafedra tekhnologii tonkikh
neorganicheskikh produktov, MITKhT = Chair of the Technology
of Fine Inorganic Products, at the Institute mentioned in the
1st Association). There are 1 table and 11 references, 3 of
which are Soviet.

Card 2/3

On the β-Modification of Spodumene   SOV/20-125-2-26/64

ASSOCIATION: Moskovskiy institut tonkoy khimicheskoy tekhnologii
               im. M. V. Lomonosova (Moscow Institute of Fine Chemical
               Technology imeni M. V. Lomonosov) Moskovskiy gosudarstvennyy
               universitet im. M. V. Lomonosova (Moscow State University
               imeni M. V. Lomonosov)

PRESENTED: October 30, 1958, by I. V. Tananayev, Academician

SUBMITTED: September 15, 1958

Card 3/3

SHAKHNO, I.V.; PLYUSHCHEV, V.Ye.

Fusibility diagrams in systems formed by rubidium and cesium
chlorides with calcium chloride. Zhur.neorg.khim. 5 no.5:
1172-1173 My '60.   (MIRA 13:7)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii im.
M.V.Lomonosova.
              (Rubidium chloride) (Cesium chloride)
                    (Calcium chloride)

PHASE I BOOK EXPLOITATION   SOV/5747

Vsesoyuznoye soveshchaniye po redkim shchelochnym elementam.   1st,
    Novosibirsk, 1958.

Redkiye shchelochnyye elementy; sbornik dokladov soveshchaniya po
    khimii, tekhnologii i analiticheskoy khimii redkikh shchelochnykh
    elementov, 27-31 yanvarya 1958 g.   (Rare Alkali Elements; Col-
    lection of Reports of the Conference on the Chemistry, Technology,
    and Analytical Chemistry of Rare Alkali   Elements, Held 27-31
    January, 1958) Novosibirsk, Izd-vo Sibirskogo otd. AN SSSR, 1960.
    99 p. 1000 copies printed.

Sponsoring Agency: Akademiya nauk SSSR. Sibirskoye otdeleniye.
    Khimiko-metallurgicheskiy institut.

Resp. Ed.: T. V. Zabolotskiy, Candidate of Technical Sciences;
    Members of Editorial Board: A. S. Mikulinskiy, Professor, Doctor
    of Technical Sciences, A. T. Logvinenko, Candidate of Technical
    Sciences, F. F. Barkova, Candidate of Chemical Sciences; Ed.:
    V. M. Bushuyeva; Tech. Ed.: A. F. Mazurova.

Card 1/5

Rare Alkali Elements; Collection (Cont.)   SOV/5747

PURPOSE : This book is intended for chemical engineers and tech-
   nicians working in metallurgical and mining operations and
   related enterprises.

COVERAGE: The collection contains reports which deal with the
   physical and analytical chemistry of rare alkali elements and
   their compounds and their reactions with mineral ores and salts.
   Methods of extraction and modern analytical techniques and
   equipment are also discussed. No personalities are mentioned.
   References accompany individual articles.

TABLE OF CONTENTS:

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Shakhno. [Moskovskiy institut tonkoy khimicheskoy tekhnologii im.
(M.V.) Lomonosova – Moscow Institute of Fine Chemical Technology
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Rare Alkali Elements; Collection (Cont.)   SOV/5747

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State Institute of Rare and Minor Metals]. The Interaction of
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sion of the AS USSR]. Some Relationships in the Interaction
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Logvinenko, A. T. and G. D. Uryvayeva. [Khimiko-metallurgi-
cheskiy institut Sibirskogo otdeleniya AN SSSR - Institute of
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Rare Alkali Elements; Collection (Cont.)   SOV/5747

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Poluektov, N. S., and M. P. Nikonova.   [Institut obshchey i
neorganicheskoy khimii AN Ukrainskoy SSR - Institute of General
and Inorganic Chemistry of the Academy of Sciences Ukrainskaya
SSR].   Use of Photometry-of-Flame Methods in Analyzing Ores
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Zakhariya, N. F., and Ts. A. Leyderman.   [Institut obshchey i
neorganicheskoy khimii AN SSSR - Institute of General and
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Rare Alkali Elements; Collection (Cont.) SOV/5747

Kozlov, A. S. [Khimicheskiy fakul'tet Moskovskogo gosudarstven-
nogo universiteta – Chemistry Department of Moscow State University].
A New (Turbidimetric) Method of Determining Small Amounts of
Cesium With the Aid of Cesium and Cadmium Ferrocyanides 79

Galkina, N. K., and M. M. Senyavin [Institut geokhimii i
analiticheskoy khimii AN SSSR – Institute of Geochemistry
and Analytical Chemistry of the Academy of Sciences USSR]
Chromatographic Separation of Mixtures of Alkali Metals 87

Zabrodin, N. I., A. A. Nechayeva, and T. V. Korobochkina
[Vsesoyuznyy nauchno-issledovatel'skiy institut galurgii – All-
Union Scientific Research Institute of Halurgy]. The Content
of Rare Alkali Elements in Natural Salts of the Soviet Union
and Prospects of Its Utilization in Industry 97

AVAILABLE: Library of Congress (QD 172.A4V8)

Card 5/5

JA/rsm/jw
11-27-61

PLYUSHCHEV, V.Ye.; SHAKHNO, I.V.; SHKLOVER, L.P.

Interaction of minerals containing rare alkaline elements with salts and oxides during sintering and melting. Part 8: Reactions taking place in the interaction of spodumene with a mixture of calcium carbonate and chloride. Izv.vys.ucheb.zav.; khim.i khim. tekh. 5 no.1:133-140 '62. (MIRA 15:4)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni Lomonsova, kafedra tekhnologii redkikh i rasseyannykh elementov.
(Spodumene) (Lithium chloride) (Calcium carbonate)

PLYUSHCHEV, V.Ye.; SAVEL'YEVA, M.V.; SHAKHNO, I.V.

Cesium propionate, butyrate, and isovaleriate.   Zhur.neorg.khim.
7 no.9:2078-2081 S '62.   (MIRA 15:9)
        (Cesium salts)   (Acids, Organic)

SHAKHNO, I.V.; PLYUSHCHEV, V.Ye.; TITUNINA, Ye.M.; SAMUSEVA, R.G.

Solubility in the system $Na_2CrO_4 - Cs_2CrO_4 - H_2O$ at 25 and
50°C. Zhur. neorg. khim. 8 no.6:1466-1469 Je '63.
(MIRA 16:6)

(Alkali metal chromates)
(Solubility)

SHAKHNO, I.V.; PLYUSHCHEV, V.Ye.; AVZHIYEVA, Ye.M.

System $Na_2Cr_2O_7 - Cs_2Cr_2O_7 - H_2O$ at 25° and $50^\circ C$.
Zhur. neorg. khim. 10 no.5:1237-1240 My '65.   (MIRA 18:6)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni
Lomonosova.

SHAKHNO, I.V.; PLYUSHCHEV, V.Ye.; AVZHIYEVA, Ye.M.

The system Na_2CrO_4 - Rb_2CrO_4 - H_2O at 25 and 50°C. Zhur. neorg. khim. 10 no.2:552-555 F '65. (MIRA 18:11)

1. Moskovskiy institut tonkoy khimicheskoy tekhnologii imeni Lomonosova. Submitted April 10, 1964.

SHAKHNO, K. U.

PHASE I   TREASURE ISLAND BIBLIOGRAPHICAL REPORT   AID 630 - I

BOOK   Call No.: AF499332
  Author: SHAKHNO, K. U.
  Full Title: COLLECTED EXAMINATION PROBLEMS IN MATHEMATICS WITH
               SOLUTIONS
  Transliterated Title: Sbornik konkursnykh zadach po matematike
               s resheniyami
PUBLISHING DATA
  Originating Agency: Leningrad State "Order of Lenin" University
    im. A. A. Zhdanov
  Publishing House: Leningrad University Publishing House
  Date: 1951   No. pp.: 217   No. of copies: 10,000
  Editorial Staff
    Responsible Editor: N. P. Yerugin
    Contributors: Profs. G. M. Fikhtengol'ts, D. K. Faddeyev, N. P. Yerugin
PURPOSE: To inform the graduates of secondary schools of requirements
    in mathematics in institutions of higher learning and thus establish
    a continuous tie between the lower and upper instruction levels.
TEXT DATA
  Coverage: The book contains 416 problems and questions in mathematics,
    which were offered at the entrance competitive examinations at the
    Universities of Leningrad and Moscow, at the Leningrad Polytechnical

1/2

Sbornik konkursnykh zadach po matematike s resheniyami   AID 630 - I

and Electrotechnical Institutes and other higher institutions of learning in 1946-50. The problems are systematized in eleven groups (pp. 5-40) and followed by detailed solutions (pp. 41-216). The groups include: algebraic formulae and equations, progressions, logarithms, combinations and Newton's binomial, trigonometric formulae and equations and their transformations, plane and sterio-metric problems in geometry, and miscellaneous problems.
No. of References: None
Facilities: None

2/2

SHAIGINO, K. U.

Sbornik konkursnykh zadach po matematike s resheniiami [Problems from mathematical examinations with the answers]. Izd. 2-e. Leningrad. Izd-vo LGU, 1953. 236 p.

SO: Monthly List of Russian Accessions. Vol. 6 No. 7 October 1953

SHAKHNO, K.U.; BARKOVSKIY, I.V., redaktor; GURDZHIYEVA, A.M., tekhnicheskiy
redaktor

[Collection of problems in mathematics; manual for teachers of the
8-10th classes] Sbornik zadach po matematike; posobie dlia uchitelei
8-10 klassov. Izd. 2. Leningrad, Gos. uchebno-pedagog. izd-vo Mini-
sterstva prosveshcheniia RSFSR, Leningradskoe otd-nie, 1954. 210 p.
(MLRA 7:10)

(Mathematics—Problems, exercises, etc.)

SHAKHNO, Konstantin Ustinovich; CHEPOVA, T.K., redaktor; MEL'NIKOVA,
G.G., redaktor; IVANOV, V.V., tekhnicheskiy redaktor.

[Manual on elementary mathematics] Spravochnik po elementarnoi
matematike. [Leningrad] Izd-vo Leningradskogo univ.,1955. 206 p.
        (Mathematics)   (MLRA 8:10)

YERUGIN, Nikolay Pavlovich; SHAKHNO, K.U., redaktor; SHCHEMELEVA, Ye.V., redaktor; IVANOVA, A.V., tekhnicheskiy redaktor.

[Implicit functions] Neiavnye funktsii. Leningrad, Izd-vo Leningrad-skogo univ., 1956. 57 p.   (Functions)   (MLRA 9:5)

YERUGIN, Nikolay Pavlovich; SHAKHNO, K.U., otvetstvennyy redaktor;
    SICHEMELEVA, Ye.V., redaktor; VODOLAGINA, S.D., tekhnicheskiy
    redaktor

    [The Lappo-Danilevskii method in the theory of linear differential
    equations] Metod Lappo-Danilevskogo v teorii lineinykh diferen-
    tsial'nykh uravnenii. [Leningrad] Izd-vo Leningradskogo univ.,
    1956. 106 p.   (MLRA 9:9)
            (Differential equations, Linear)

GOLDBERG, Abram Girshevich; SHAKHNO, K.U., red.; RAKOVITSKIY, I.G., tekhn.red.

[Functions and their study. Derivatives, Teacher's manual] Funktsii
i ikh issledovanie. Proizvodnaia. Iz opyta uchitelia. Leningrad.
Gos.uchebno-pedagog. izd-vo M-va prosv. RSFSR, Leningr. otd-nie,
1957. 67 p.   (MIRA 11:3)
          (Functions)

SHAKHNO, Konstantin Ustinovich; BARKOVSKIY, I.V., red.; LEONT'YEVA, L.A., tekhn.red.; BOL'SHAKOV, V.A., tekhn.red.

[Handbook on mathematics; textbook for students in grades 8-10]
Spravochnik po matematike; posobie dlia uchashchikhsia 8-10 kl.
Leningrad, Gos. uchebno-pedagog. izd-vo M-va prosv. RSFSR, 1957.
214 p.   (MIRA 11:4)
          (Mathematics--Study and teaching)

SHAKHNO, Konstantin Ustinovich; GUSAK, A.A., red.; BELEN'KAYA, I.Ye.,
tekhred.

[Textbook on mathematics for persons entering institutions
of higher learning; problems presented on competitive examinations
and their solutions] Posobie po matematike dlia postupaiushchikh
v vysshie uchebnye zavedeniia; sbornik konkursnykh zadach po mate-
matike s resheniiami. Izd.4. Minsk, Izd-vo Belgosuniv. im. V.I.
Lenina, 1960. 233 p.   (MIRA 13:7)
          (Mathematics--Problems, exercises, etc.)

SHAKHNO, Konstantin Ustinovich;IL'INA, M.Ye., red.; ZHUKOVA, Ye.G.,
    tekhn. red.

[How to prepare for entrance examinations to institutions of
higher learning; mathematics] Kak gotovit'sia k priemnym ek-
zamenam v vuz; matematika. Leningrad, Izd-vo Leningr.univ.,
1961. 246 p.   (MIRA 15:1)
            (Mathematics---Study and teaching)

SHAKHNO, Konstantin Ustinovich; GUSAK, A.A., red.; MORGUNOVA, G.M.,
     tekhn. red.

[Handbook on mathematics for students entering instituions of higher
learning; mathematical problems and solutions given on competitive
examinations] Posobie po matematike dlia postupaiushchikh v vys-
shie uchebnye zavedeniia; sbornik konkursnykh zadach po matematike s
resheniiami. Izd.6. Minsk, Izd-vo M-va vysshego, srednego spetsial'-
nogo i professional'nogo obrazovaniia BSSR, 1962. 245 p.
                                              (MIRA 15:6)
          (Universities and colleges—Entrance requirements)
               (Mathematics—Problems, exercises, etc.)

SHAKHNO, Konstantin Ustinovich; KOSTYUKOVETS, F.T., red.

[Collection of difficult problems in elementary
mathematics] Sbornik zadach po elementarnoi matematike
povyshennoi trudnosti. Minsk, Vysshaia shkola, 1964. 523 -.
(MIRA 17:5)

SHAKHNO, Konstantin Ustinovich; VEREVKINA, N.M., red.

[How to prepare for the entrance examinations in mathematics at a school of higher education] Kak gotovit'-sia k priemnym ekzamenam v vuz po matematike. Izd.3., ispr. i dop. Moskva, Vysshaia shkola, 1965. 271 p.

(MIRA 18:5)

L 9661-66   EWT(d)/EWP(c)/EWP(v)/T/EWP(k)/EWP(1)/ETC(m)   WW

TITLE: Standardized semiautomatic CO_2 shielded welding machines

TOPIC TAGS: gas welding, arc welding, semiautomatic welding power, welding
equipment, welding equipment component, welding technology / PGSh-5 semiautomatic
CO sub 2 shielded welding machine, PGSh-5 semiautomatic CO sub 2 shielded welding
machine

ABSTRACT: Considering the diversity of the work parts welded by the CO_2-shielded
method, a large number of different units of welding apparatus and equipment is needed
for this purpose. In this connection, the author describes a set of standardized com-
ponents (Fig. 1) which can be assembled together as needed for the semiautomatic
CO_2 shielded welding machines designed by the TsNIITMASh Central Scientific Research
Institute of Technology and Machine Building. Thus, e.g. depending on the type and
position of the seams, the rigidity of electrode wire, and the welding conditions,
either a gun-type or a burner-type holder has to be used. If considerable depth of
fusion is required, a fitting assuring minimal overhang of electrode wire is needed.

Card 1/5   UDC: 621.791.85.037
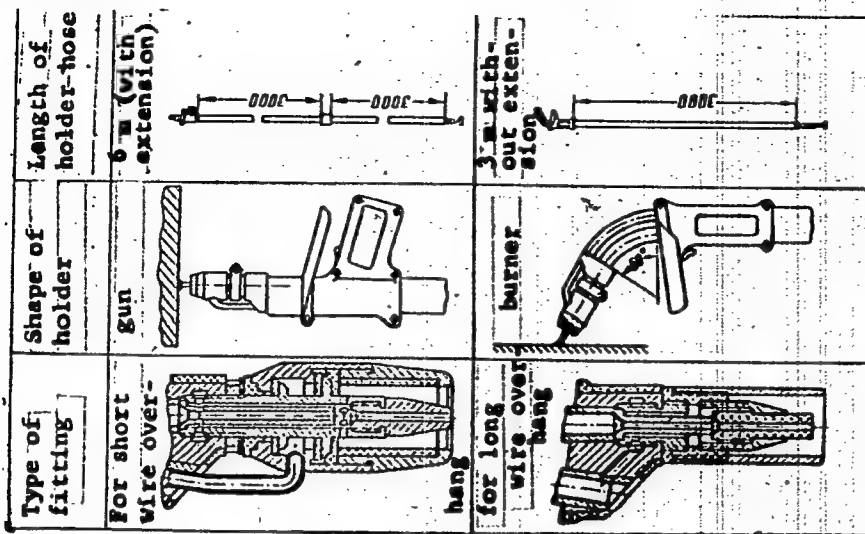
L 9661-66

ACC NR: AP5027608

Fig. 1,a. Variants of accessories for TsNIITMASh-designed standardized semiautomatic welding machines
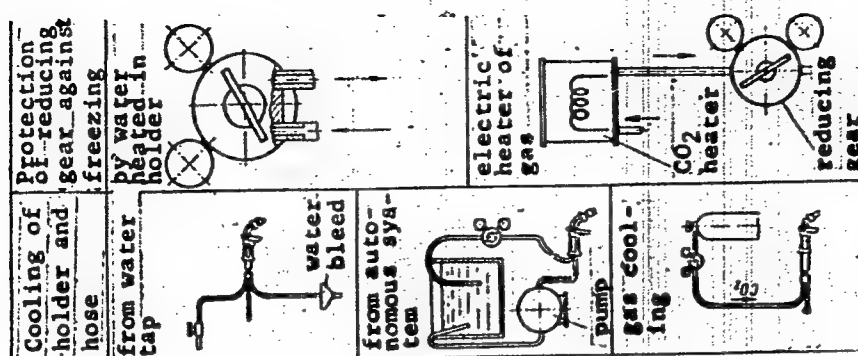
Card   2/5

L 9661-66

ACC NR: AP5027608

Fig. 1, b. Variants of accessories for TsNIITMASh-designed standardized semiautomatic welding machines

Card 3/5
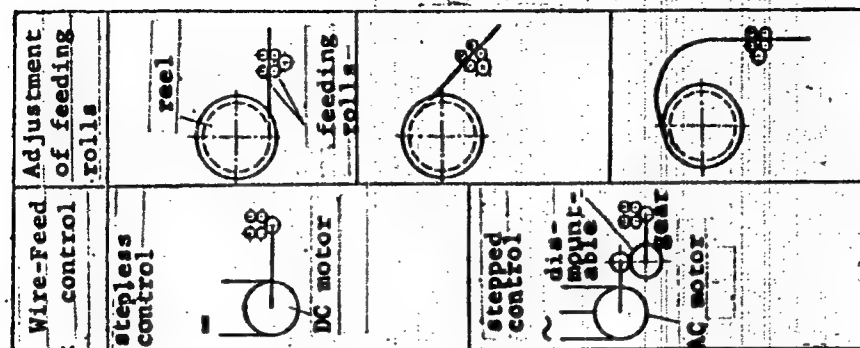
L 9661-66
ACC NR: AP5027608

Fig. 1, c. Variants of accessories for TsNIITMASh-designed standardized semiautomatic welding machines

Card 4/5

L 9661-66

ACC NR: AP5027608

High-speed welding requires water cooling of the current-conducting nose and holder fitting. Precision welding requires use of an adjustable-RPM DC motor to drive the electrode-feed mechanism. In addition, two basic modifications of the semiautomatic welding machine are needed in virtually any type of large-scale welding operations: a machine with a smoothly adjustable electrode feeding rate that is dependent on the arc voltage, and a machine with an independent electrode feeding system. Accordingly, the TsNIITMASh has designed two standardized semiautomatic machines of this kind: the PGSh-4M and the PGSh-5. The PGSh-4M makes it possible to use electrode wire of 1.6 and 2.0 mm diameter for low-voltage welding, and thus helps to save scarce electrode wire of smaller diameters, while the PGSh-5 can be used for regular welding operations which do not require frequent changes of welding regime. Orig. art. has: 2 figures, 1 table.

SUB CODE: 11, 13/   SUBM DATE: none/   ORIG REF: 000/   OTH REF: 000

Card 5/5

SHAKHNOV, I.F. (Moskva)

Steady motion of a gas with a variable supply of mass and energy.
PMTF no.3:117-119 S-O '61.   (MIRA 14:8)
                    (Gas flow) (Dynamics)

33592
S/207/61/000/004/003/012
E032/E514

10 1230 1327

AUTHOR: Shakhnov, I.F. (Moscow)

TITLE: On the non-adiabatic flow of a perfect gas past a
             slender body pointed in front at a high supersonic
             velocity

PERIODICAL: Akademii nauk SSSR. Siberskoye otdeleniye.
             Zhurnal prikladnoy mekhaniki i tekhnicheskoy fiziki,
             no.4, 1961, 114-117

TEXT: The author is concerned with the steady state non-
adiabatic flow of a non-viscous, non-thermally conducting gas,
having a constant specific heat, past slender bodies pointed in
front. The equations of motion, continuity and heat flow to
the body are written down in a cartesian set of coordinates
attached to the body and are simplified by assuming that the
perturbation of the flow by heat sources are of the same order
of magnitude or smaller than the perturbations due to the body
itself (Ref.1: Chernyy G.G. Flow of a gas with a large supersonic
velocity. Fizmatgiz, 1959). It is also assumed that the maximum
relative thickness of the body is small so that its second and
Card 1/2

On the non-adiabatic flow ...

33592
S/207/61/000/004/003/012
E032/E514

higher powers can be neglected compared with unity. It is shown
that the final set of equations contains three dimensionless
parameters. A similarity criterion is derived for the flow
past affine-similar bodies subject to similar heat release.
The general analysis is then specialised to the case of super-
sonic flow past a flat plate at zero angle of attack with a
rectangular region to which heat is uniformly supplied. The
region is in immediate contact with the plate. The general
differential equations were integrated numerically on an
electronic computer. The pressure distribution over the plate
was obtained and it was found that the pressure rises along the
plate to a maximum value and then tends to a lower constant value.
The general conclusion is that the non-adiabatic flow past
slender bodies pointed in front with a high supersonic velocity
is equivalent to a two-dimensional steady state motion of a gas
ejected by a piston with a simultaneous supply of heat from
outside. A third-order nonlinear differential equation, which
must be solved numerically, is derived for the latter case.
Acknowledgments are expressed to G. G. Chernyy for advice. There
are 2 figures and 2 Soviet-bloc references.
SUBMITTED: May 24, 1961
Card 2/2

10.3100

26.2181

31072
S/179/61/000/005/003/022
E031/E426

AUTHOR: Shakhnov, I.F. (Moscow)

TITLE: On disturbances in a supersonic flow caused by discrete or continuous heat sources

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye tekhnicheskikh nauk. Mekhanika i mashinostroyeniye. v.5, 1961, 16-21

TEXT: The flow is assumed to be steady and the disturbances sufficiently small for second order terms to be neglected. The fluid is an ideal gas of constant heat capacity; only two-dimensional flows are considered. It is shown that the disturbances to the pressure caused by a point heat source at the origin, propagate along characteristics which pass through the origin, and are proportional to the strength of the source. In the case of non-adiabatic flow over a curved body, with heat sources just outside it, it is shown that the stream lines become less convex. It is also shown that the disturbances caused by the surface and those caused by the heat sources are superimposed. By proper choice of the strength and position of the heat sources, the shock waves can be made to vanish. There are 1 figure and Card 1/2

31072
S/179/61/000/005/003/022
On disturbances in a supersonic ...   E031/E426

2 Soviet-bloc references.

SUBMITTED: April 18, 1961

Card 2/2

33556
S/179/61/000/006/005/011
E032/E314

10.3100   1327

AUTHOR: Shakhnov, I.F. (Moscow)

TITLE: Application of the method of small perturbations to
           the calculation of the nonadiabatic supersonic flow
           of an ideal gas over a flat plate

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
              tekhnicheskikh nauk. Mekhanika i mashinostroyeniye,
              no. 6, 1961, 37 - 41

TEXT: The author considers the nonadiabatic flow over a flat
plate at zero angle of attack. It is assumed that the gas is
ideal, i.e. non-viscous, non-thermally conducting. The non-
adiabatic supersonic flow was discussed by the author in a
previous paper (Ref. 1: this journal, no. 5, 1961) and the
equations derived in that publication are used in the present
paper. It is assumed that there is a layer of thickness h and
length L adjacent to the surface of the plate in which the
amount of heat given to the unit mass of gas per unit time is
constant. An estimate is made of the main parameters which
determine the flow both in the latter zone and in the region
Card 1/2

Application of ....

33556
S/179/61/000/006/005/011
E032/E314

external to it. It is shown that the presence of a rectangular
heated zone is equivalent (for the adiabatic part of the flow, i.e.
that part of the flow which does not pass through the zone) to
flow past a curvilinear surface whose equation can be explicitly
expressed in terms of the heat supplied to the zone, the Mach
number and the dimensionless length of the zone. A heat wake is
formed behind the zone and the pressure and velocity within it
are the same, while the density is smaller, as compared with the
region outside the above zone. The thermal wake contains a
"core" in which the density remains constant. The limits of
applicability of the linearized theory of Ref. 1 are indicated.
There are 2 figures and 2 Soviet-bloc references.

SUBMITTED: April 18, 1961

Card 2/2

S/124/62/000/006/010/023
D234/D308

10.3100

AUTHORS: Shakhnov, I. F. and Frost, V. A.

TITLE: Flow of a supersonic stream of ideal gas past a plane
plate in presence of volume heat liberation

PERIODICAL: Referativnyy zhurnal, Mekhanika, no. 6, 1962, 23, ab-
stract 6B113 (Tr. Mosk. fiz.-tekhn. in-ta, 1961, no.7,
110-123)

TEXT: Supersonic stabilized flows of an ideal gas in presence of
volume heat liberation is considered. The authors investigate as an
example the flow at a zero angle of attack past a plane plate
with adjoining rectangular zone of uniform heat liberation. This
liberation of heat causes a deviation of the flow which in its
turn causes a condensation discontinuity to appear at a certain
distance from the zone of heat liberation. The authors give a for-
mula for determining the point of generation of the condensation
discontinuity as the point of intersection of first family charac-
teristics, nearest to the plate. The results of calculations ac-

Card 1/2

Flow of a supersonic ...

S/124/62/000/006/010/023
D234/D308

cording to this formula are close to the results obtained by the
method of characteristics. Calculations by the method of charac-
teristics show that in the case of a thin aerodynamical profile
and small heat access the vorticity of the flow is small. Neglect-
ing the vorticity, the authors linearize the equation of velocity
potential and reduce it to a Poisson equation with the right-hand
side depending on the distribution of the quantity of heat supplied
to a mass unit of gas in a time unit. Results of calculating pres-
sure distribution on the plate with an adjoining rectangular zone
of uniform heat liberation are given for Mach's values of power
of the heat sources. As can be seen from the graphs given, in the
case of small heat liberation the results obtained according to
the linear theory are close to those obtained by the method of
characteristics. /_Abstracter's note: Complete translation._7

Card 2/2

S/0179/64/000/004/0154/0157

ACCESSION NR: AP4043902

AUTHOR: Shakhnov, L. F. (Moscow)

TITLE: Flow of an ideal, supersonic, non-adiabatic gas around a flat plate

SOURCE: AN SSSR. Izvestiya. Mekhanika i mashinostroyeniye, no. 4, 1964, 154-157

TOPIC TAGS: rocket, aerodynamics, fuel combustion, gas flow, nonadiabatic gas flow, supersonic nonadiabatic gas flow, supersonic gas flow, rocket fuel combustion

ABSTRACT: The author considers the flow of an ideal supersonic gas around a flat plate with a heat release zone connected with the streamlines and adjoining the plate surface. It is assumed that the heat release rate is directly proportional to the fuel combustion rate as calculated by a second order kinetic equation with a temperature relationship derived from the law of Arrhenius. It is also assumed that the flow is uniform and rectilinear in the initial section and that the fuel is equally mixed with the air in a stoichiometric relationship. The pressure distribution on the plate surface is described using the characteristic method on the basis of numerical solutions. For simplification of non-adiabatic flow, the Cartesian coordinates are transformed into curvilinear ones. The equation for

Card 1/6

ACCESSION NR: AP4043902

stationary continuum flow of a perfect gas is expressed as: (1)

$$\rho q \frac{\partial q}{\partial s} = -\frac{\partial p}{\partial s}, \qquad \rho q^\circ \frac{\partial \theta}{\partial s} = -\frac{\partial p}{\partial n}, \qquad \frac{\partial \ln \rho q}{\partial s} = -\frac{\partial \theta}{\partial n}$$

And after transformations and additions: (2)

$$\rho^\circ \frac{dq^{\circ\prime}}{dp^\circ} = -\frac{2}{\gamma_1 M_1^\circ}, \qquad \frac{d}{ds^\circ}\left(c_p^\circ T^\circ + \frac{\gamma_1-1}{2} M_1^\circ q^\circ\right) = (\gamma_1-1)\gamma^\circ R^\circ T^\circ \frac{c^\circ}{M}$$

with   (3)

$$\rho^\circ = \frac{p^\circ}{R^\circ T^\circ}, \qquad M^\circ = M_1^\circ \frac{q^{\circ\circ}}{\gamma^\circ R^\circ T^\circ}$$

showing the density and M^2. Further, the article considers that heat release is due to chemical reactions. For a perfect gas (non-viscous, without thermal conductivity and thermal convection), the heat input dQ to the elementary fluid volume moving at a speed of q is in direct ratio to the mass dm of burnt fuel: (4)

$$dQ = \Delta H dm \quad \text{или} \quad e = \frac{\Delta H}{1+al_o} \frac{dm^\circ}{dt} \quad \left(m^\circ = \frac{m}{m_1}\right)$$

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ACCESSION NR: AP4043902

For illustrating the chemical kinetics of fuel combustion, the following expression is used in the article:

$$\frac{d[v_t]}{dt} = k\sqrt{T}\,[v_t][v_0]\exp\left\{-\frac{E}{R_0 T}\right\} \tag{5}$$

where the molar fuel concentration of fuel and oxygen per unit volume are included. For calculating the burnt fuel, this relationship is transformed to:

$$\frac{dm^s}{dt^s} = \frac{L_0}{\beta + L_0}\frac{B}{M}\frac{\rho^*[1-m^*][1-\beta m^*]}{\sqrt{\tau/\Pi^s}}\exp\left\{-\frac{E^s}{T^s}\right\} \qquad B = \frac{r k p_0 L}{M_0\sqrt{T_1/\Pi_1}}, \qquad E^s = \frac{E}{R_0 T_1} \tag{6}$$

where M_0 is the molar mass of oxygen,   is the initial density of the mixture and $\underline{r}$ is the initial weight proportion of oxygen in the oxidizer. The formulas used in cases including many components are the same as for a gas consisting of one component. The article next considers the change in density during combustion. Fig. 1. in the Enclosure shows fuel combustion adjoining the plate, this phenomena being considered the same as in a pipe of constant section. As the fuel burns up the density drops until the pressure begins to rise due to expansion, caused by fuel combustion far from the wall. The type of fuel combustion illustrated in Fig. 2. of the Enclosure does not develop as fast as in the first case, and the heat is released mainly while expanding. Thus, the degree of pressure

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ACCESSION NR: AP4043902

increase is lower and the field of constant pressure at maximum density is lacking. The field of constant pressure at maximum density is lacking. "The author expresses his thanks to Ye. S. Shchetinkov for proposing the problem and to Yu. G. Fedyayev for his valuable observations while performing the tests and discussing the paper." Orig. art. has: 2 figures and 10 equations.

ASSOCIATION: none

SUBMITTED: 29Oct63   ENCL: 02

SUB CODE: ME, PR   NO REF SOV: 004   OTHER: 001
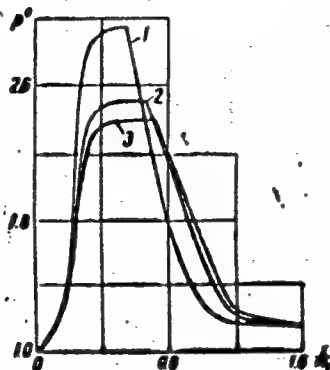
Card 4/6

ACCESSION NR: AP4043902

ENCLOSURE: 01

Figure 1.

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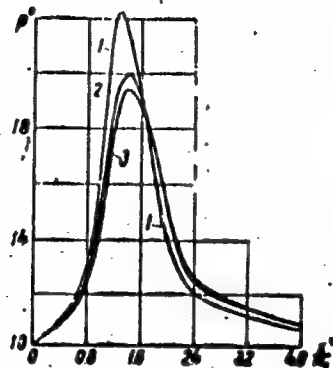ACCESSION NR: AP4043902

Figure 2.

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SHAKINOV, I.F.   (Moskva)

   Supersonic nonadiabatic perfect gas flow about a flat plate.
   Izv. AN SSSR Mekh. i mashinostr. no.4:154-157 Jl-Ag'64
                                              (MIRA 17:8)

L 54775-65   EPA/EWT(1)/EWP(m)/EWT(m)/ENP(w)/EPF(c)/EPR/T/FCS(k)/EWA(c)/
  EWA(1)   Pd-1/Pr-4/Ps-4/Pt-7/Pi-4   EM/WW/JW/WE   UR/0373/65/000/003/0017/0024
ACCESSION NR: AP5016228

AUTHOR: Shakhnov, I. F. (Moscow)

TITLE: The ignition of a stoichiometric mixture in the laminar supersonic boundary
layer on a flat plate

SOURCE: AN SSSR. Izvestiya. Mekhanika, no. 3, 1965, 17-24

TOPIC TAGS: supersonic combustion, ignition, igniter, ignition source, combustion,
airbreathing propulsion

ABSTRACT: An analysis was made of the ignition and combustion process induced when
a stoichiometric fuel (pentane, isobutane, gasoline, kerosine or T-5 jet fuel)-air
mixture flows at supersonic velocity (up to M 5) under zero angle of attack over
an impermeable flat plate maintained at a constant temperature. It was assumed that
the pressure drop in the free stream is zero and that ignition takes place in the
laminar boundary layer on the plate. The analysis based on the use of boundary
layer equations yielded expressions for the minimum length of the plate required for
ignition as a function of kinetic and flow parameters (Mach number, Schmidt number,
free stream and wall temperatures, activation energy, and heat of combustion). Cal-
culations of the location of the flame front and ignition zone were made for free

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L 54775-65
ACCESSION NR: AP5016228

stream temperatures from 300 to 1000K and Schmidt numbers of 0.4 to 40 at a constant wall temperature of 1500K. The calculations showed that an increase in Mach number and a decrease in the Schmidt number lead to a decrease in the minimum plate length. The latter was found to be very sensitive to a change in the free stream temperature. For instance at M = 5, S = 4, and E = 40 kcal/mole, the ratio of the minimum plate lengths at 300 and 1000K amounts to 94:1. The use of the boundary layer equations in the present analysis is permissible when the ignition delay time is long enough so that the effect of the chemical reactions becomes pronounced only at a given distance from the leading edge of the plate where the boundary layer has already developed. As the flame front develops, the zone of incipient chemical reaction is shifted in the transverse direction from the plate into the stream. This is accompanied by an increase in flow velocity causing a longitudinal elongation of the reaction zone. Only the initial section of the plate in which the reaction zone is close to the plate wall may thus be considered critical. Orig. art. has: 4 figures and 25 formulas.

ASSOCIATION: none

SUBMITTED: 02Nov64   ENCL: 00   SUB CODE: FP, ME

OTHER: 002   ATD PRESS: 4028

NO REF SOV: 006

Card 2/2

SHAVELEV, L.F. (Moskva)

Ignition of a stoichiometric mixture in the laminar supersonic
boundary layer of a flat plate. Izv. AN SSSR. Mekh. no.3:17-24
My-Je '65. (MIRA 18:7)

SENKOV, A.M., professor, doktor tekhnicheskikh nauk; SHAKHNOV, I.I., inzhener.

New method for designing improved diaphragm dynamometers. [Trudy] VNIMI no.30:210-213 '56.   (MLRA 9:11)
                    (Dynamometer)

26.1410

AUTHOR: Shakhnov. I. I.

TITLE: On Neuringer's error

PERIODICAL: Zhurnal tekhnicheskoy fiziki, v. 32, no. 12, 1962, 1495-1496

TEXT: The American Aviation Corporation published a study by D.L.Neuringer on the theory of magnetohydrodynamic generators. It is shown that the variation problem for determining the conditions under which the useful power of the generator is greatest contains wrong assumptions. The Euler equation

$$\sigma k B + \sigma \lambda_1 B^2 + \sigma k \lambda_2 B - m\frac{d}{dx}\left(\frac{\lambda_1}{y}\right) - \omega p y\frac{d\lambda_2}{dx} - mu\frac{d\lambda_2}{dx} = 0,$$

$$\frac{k^2\sigma}{y^2} + \frac{\sigma k \lambda_1 B}{y^2} + \frac{\sigma k^2\lambda_2}{y^2} - \frac{m\lambda_1}{y^2}\frac{du}{dx} - \omega p u\frac{d\lambda_2}{dx} = 0,$$

$$\frac{d\lambda_1}{dx} + \omega u y\frac{d\lambda_2}{dx} = 0.$$

together with the equation of motion and the equation of the conservation

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On Neuringer's error

of energy is a system which has no unique solutions. The determinant

$$
\begin{vmatrix}
0 & 0 & -\dfrac{m\lambda_1}{y^2} & 0 & -\omega p u \\
0 & 0 & 0 & -1 & -\omega u y \\
\dfrac{m\lambda_1}{y^2} & 0 & 0 & -\dfrac{m}{y} & -(\omega p y + m u) \\
0 & \dfrac{m}{y} & 1 & 0 & 0 \\
\omega p u & \omega u y & \omega p y + m u & 0 & 0
\end{vmatrix}
$$

of this system, consisting of the coefficients of the first derivatives of
the functions sought, is of odd order and antisymmetric, hence equal to zero.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A. F. Ioffe AN SSSR,
Leningrad (Physicotechnical Institute imeni A. F. Ioffe
AS USSR, Leningrad)

SUBMITTED: April 20, 1962

Card 2/2

CHEKMAREV, I.B. (Leningrad); SHAKHNOV, I.I. (Leningrad)

Helical motion of a conducting gas between coaxial permeable
cylinders in the presence of a longitudinal electric field.
PMTF no. 6;3-6 N-D '63.   (MIRA 17:7)

L 2458-66   EWT(1)/EWP(m)/EPA(sp)-2/EPA(w)-2/T-2/EWA(m)-2   LJP(c)

ACCESSION NR: AP5020718   UR/0057/65/035/008/1359/1363

AUTHOR: Shakhnov, I. I.; Chelmarev, I. B.

TITLE: Influence of electric and magnetic fields on the electron temperature in a magnetogasdynamic channel

SOURCE: Zhurnal tekhnicheskoy fiziki, v. 35, no. 8, 1965, 1359-1363

TOPIC TAGS: plasma flow, plasma device, electric energy conversion, electric field, magnetic field, electron temperature, magnetogasdynamics

ABSTRACT: The authors calculate the variations of electron temperature during one-dimensional flow of a weakly ionized plasma in crossed electric and magnetic fields. The calculations were undertaken because of their interest in connection with plasma energy converters. The plasma is assumed to consist of two components with widely differing ionization potentials and to flow transversely to the magnetic field. The electric field is assumed to be perpendicular to the magnetic field but not necessarily to the flow velocity. The hydrodynamic equations for the electron gas with electron diffusion and source terms are quoted from Chapman and Cowling's monograph and are simplified by neglecting electron inertial and vis-

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L 2458-66

ACCESSION NR: AP5020718

cosity. The electron source function is fixed by assuming equilibrium between the electrons and the atoms and ions of the easily ionized plasma component. With these equations there is calculated the ultimate electron temperature in the flowing plasma and also the behavior of an initially isothermal plasma during transition to the asymptotic state. It is found that the flow in crossed fields considerably increases the electron temperature above the ion temperature. Numerical results for a mixture of argon and potassium vapor are presented graphically, and it is concluded that the optimum Mach number is greater than that calculated by D.T. Swift-Hook and I.K.Wright (J. Fluid Mech., 5, 1, 97, 1963). Orig. art. has 30 formulas and 2 figures.

ASSOCIATION: Fiziko-tekhnicheskiy institut im. A.F.Ioffe AN SSSR, Leningrad (Physico-technical Institute, AN SSSR)

SUBMITTED: 17Nov64   ENCL: 00   SUB CODE: ME

NR REF SOV: 003   OTHER: 003

BVK

Card 2/2

SHAKHNOVA, L. V.

Effectiveness of direct and backcrossing in poultry breeding. Agro-
biologiia no.1:143-145 Ja-F '58.   (MIRA 11:2)

1. Vsesoyuznyy nauchno-issledovatel'skiy institut ptitsevodstva.
                         (Poultry breeding)

Q

USSR / Farm Animals. Poultry.

Abs Jour   : Ref Zhur - Biologiya, No 5, 1959, No. 21308

Author   : Shakhnova, L. V.
Inst   : Not given
Title   : Selecting Basic Breeds in Interbred Crossings

Orig Pub   : Ptitsevodstvo, 1958, No 4, 29-32

Abstract   : At the Arzhenka sovkhoz an experiment was carried out
             in order to clarify the effectiveness of direct and
             reciprocal crossing between Russian white and
             Zagorskaya white breed hens. Each of the groups
             consisted of 200 heads which were raised at the same
             feeding and keeping conditions. It was found that 8.9
             percent more chicks were produced in direct crossing
             (Russian white hens X Zagorskaya white breed roosters)
             as in reciprocal crossing (Zagorskaya white hens X
             Russian white roosters). The weight of hybrids in

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Q

USSR / Farm Animals. Poultry.

Abs Jour   : Ref Zhur - Biologiya, No 5, 1959, No. 21308

direct crossing was by 9.7 percent and in reciprocal
crossing by 18.9 percent larger than that of Russian
white chickens. According to their measurements, the
hybrids of direct crossing excel the Russian white
chickens. At a 20-day long fattening period, the weight
gain amounted to 53.3 percent in reciprocally crossed
hybrids, to 39.3 percent in directly crossed hybrids,
and to 40.5 percent in Russian white breed hens. For a
10-month period, egg production amounted to 122 eggs
in the directly crossed hybrids, and to 137.5 eggs
in reciprocally crossed hybrids. Since it produces
best results, reciprocal crossing (hens of generally
useful breeds X roosters of egg producing breeds) may
be recommended both for economic and breeding purposes.
-- K. V. Tatariyskaya

Card 2/2

81

SHAKHNOVA, L. V.

Cand Agr Sci - (diss) "Increasing the productivity of crossbreed
hens by means of using various combinations of breeding stocks."
Moscow, 1961. 16 pp; (Moscow Veterinary Academy of the Ministry
of Agriculture RSFSR); 200 copies; price not given; (KL, 7-61 sup,
253)

LASHKEVICH, A.M.; TERENT'YEVA, A.A.; IVANOVA, L.S.; BORODULINA, M.A.; VELICHENKO, I.N.; NIKULENKO, V.S.; KONSHINA, T.I.; SHAKHOVA, T.P.; NYASHINA, A.A.; YASINSKAYA, Z.A.; AGAL'TSEVA, N.B.; SEL'MENSKAYA, Ye.G.; KRETSMER, V.L.; KONONOVICH, L.K.; FEDORAYEVA, A.M.; TKACHUK, L.Ya.; VYATKINA, G.A.; SLOUSHCH, V.S.; RACHINSKAYA, L.N.; PORTNAYA, R.Yu.; KARAKOVSKAYA, E.M.; POKROVSKAYA, M.A.; KORNEVA, A.I.; YERSHOVA, K.F., otv. red.; Prinimal uchastiye KAMANOV, M.I., red.; LAGAREVA, A.P., otv. za vypusk; NIKITINA, I.P., tekhn. red.

[Economy of Novosibirsk Province; collection of statistics] Narodnoe khoziaistvo Novosibirskoi oblasti; statisticheskii sbornik. Novosibirsk, Gosstatizdat TsSU SSSR, 1961. 331 p.   (MIRA 15:6)

1. Novosibirsk. Oblastnoye statisticheskoye upravleniye. 2. Nachal'nik Statisticheskogo Upravleniya Novosibirskoy oblasti (for Yershov). 3. Zamestitel' nachal'nika Statisticheskogo Upravleniya Novosibirskoy oblasti (for Kamanov).
(Novosibirsk Province—Economic conditions)

KRAVCHIK, Feliks Ivanovich;KANEVSKIY, I.L., retsenzent; LAPINA, N.V.,
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red.; SHISHKOVA, L.M., tekhn. red.

[Planning and organization of the repair of ships] Planirovanie
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    (Ships--Maintenance and repair)   (MIRA 15:2)

POLOTSKIY, Solomon Gertsovich;LOGINOV, S.P., kand. ekon. nauk, retsenzent;
SATANOVSKIY, Ya.S., inzh., retsenzent; SHUL'KIN, P.S., nauchnyy
red.; SHAKHNOVA, V.M., red.; TSAL, R.K., tekhn. red.

[Some problems in the economics of shipbuilding] Nekotorye vopro-
sy ekonomiki sudostroeniia. Leningrad, Gos. soiuznoe izd-vo
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                    (Shipbuilding)

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TAUBIN, Georgiy Osipovich. Prinimal uchastiye SHAVROV, Yu.N.;
BAYKOV, D.I., kand. tekhn.nauk, retsenzent; KOROTKIN, Ya.I.,
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[Strength of ship structures from aluminum alloys; design and
calculations] Prochnost' sudovykh konstruktsii iz aliumineievykh
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RUSSO, Vladimir Leonidovich; KOROBOV, P.D., inzh., retsenzent;
RAZDUY, F.I., kand. tekhn. nauk, retsenzent; ALSUF'YEV,
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[Welding aluminum alloys in an inert gas atmosphere] Svarka aliuminievykh splavov v srede inertnykh gazov. Leningrad, Sudpromgiz, 1962. 160 p. (MIRA 15:8)
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nauchnyy red.; SHAKHNOVA, V.M., red.; SHISHKOVA, L.M.,
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[Planning the shape of a ship and preparing preliminary draw-
ings]Proektirovanie formy sudna i postroenie teoreticheskogo
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    MINYAYEV, V.I., retsenzent; TSVENEV, V.L., retsenzent;
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    Sudpromgiz, 1963. 259 p.   (MIRA 16:7)
                        (Shipbuilding--Management)

OKERBLOM, Nikolay Oskarovich; DEMYANTSEVICH, Vladimir Petrovich;
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    retsenzent; MATSKEVICH, V.D., kand. tekhn.nauk, retsenzent;
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    retsenzent; SHAKHNOVA, V.M., red.; FRUMKIN, P.S., tekhn.red.

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V.I., nauchn. red.; SHAKHNOVA, V.M., red.

[Motorboats and launches made of plastics] Shliupki i ka-
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MALOKEDOV, A.N., inzh., retsenzent; KRAKOVSKIY, I.I.,
doktor tekhn. nauk, prof., nauchn. red.; SHAKHNOVA,
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IAkornye i shvartovnye ustroistvo; proektirovanie i
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(MIRA 18:1)

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        SMIRNOVA, M.K., kand. tekhn. nauk, retsenzent; AL'SHITS,
        I.M., nauchn. red.; SHAKHNOVA, V.M., red.

        [Testing and inspecting glass reinforced plastics used in
        shipbuilding] Ispytanie i kontrol' sudostroitel'nykh
        stekloplastikov. Leningrad, Sudostroenie, 1965. 186 p.
                                            (MIRA 18:6)

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DIYEV, B.F., kand. tekhn. nauk, retsenzent;
KOPEYETSKIY, V.V., kand. tekhn. nauk, retsenzent;
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[Water jet propellers; theory and calculations] Vodomet-
nye dvizhiteli; teorija i raschet. Leningrad, Sudo-
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[Automatic gas cutting in shipbuilding] Opyt avtomatiche-
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HD9715.R92S4

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Local pupillography in neuro-ophthalmological diagnosis. Vop.
neirokhir. 22 no.3:20-25 My-Je '58   (MIRA 11:8)

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        (PUPILS,
             pupillography, diag. value (Rus))

SHAKHNOVICH, A.R.

Cinematographic investigation of the cochleopapillary reflex. Vest.
oto-rin. 16 no.4:76-77 Jl-Ag '54.   (MLRA 7:8)

1. Iz kafedry normal'noy fiziologii (zav. prof. A.T.Pshonik)
Krasnoyarskogo meditsinskogo instituta.
          (REFLEX,
               *cochleopapillary reflex, cinematography)
          (COCHLEA, physiology,
               *cochleopapillary reflex, cinematography)
          (PUPILS, physiology,
               *cochleopapillary reflex, cinematography)